
DROUGHT EARLY WARNING SYSTEM AND PREPARATION OF PLANTING PATTERN OF GLOBAL CLIMATE CHANGES IN CONNECTION WITH MOBILE TECHNOLOGY-BASED

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ABSTRACT

In developing countries, drought due to natural disasters such as flood result in massive loss of farming practices. Warning communities of the incoming flood provides an effective solution to this by giving people sufficient time to prepare and protect their crop pattern and farm activities. However, the range of early warning system solutions introduces a tangle of conflicting requirements including cost and reliability, and creates several interesting problems from factors as diverse as technological, social, and political. The complexity of these systems and need for autonomy within the context of a developing country while remaining maintainable and accessible by nontechnical personnel provides a challenge not often solved within developed countries, much less the developing. After describing this problem, the paper discusses a proposed solution for the problem, initial experiments in implementing the solution, and lessons learned through that work.

Keywords : Early warning system, drought, cropping pattern. mobile applications.

INTRODUCTION

Global Climate Change due to El-Nino is a natural phenomenon of climate change that are not regularly marked with increasing temperature of the equatorial Pacific ocean surface. Increasing sea surface temperatures has resulted in drought in some areas of eastern Indonesia, including some areas of East Java. During the period of El Nino, the rainy season which occurs under normal and kemaraun season is longer than normal. Conditions such adverse effects on agricultural production, plantation, fishery and animal husbandry and other sectors. Year 2002 is a puzzle that must be wary of the possibility of El-Nino and should be anticipated for its impact on food insecurity could be reduced as small as possible is to create an early warning system. So in this study the problems that arise are 1) global climate change will affect the behavior of the climate elements such as rainfall, temperature, radiation, and evapotranspiration. 2) The scope of the assessment location is dry land in East Java Province, and 3) management of the cropping pattern is one key to the success of farming food crops on dry land. Early Warning System in question

here is to create an information to the users i.e.: Farmers, Entrepreneurs and Policy Makers by applying geographic information system on-line, with information about climate change, drought information and information on cropping pattern. This study aims to: analyze the temporal characteristics of climate change classification spacio oldeman in dryland rainfall especially in the era after the 1980's, analyzing the vulnerability of dryland regions to drought, and develop zoning areas in accordance with the level of dryness, determine the cropping pattern in land management dry by taking into account rainfall, soil moisture and plant (crop water balance), and the behavior of farmers in dealing with drought-based information technology (geographic information system on line). While the outcome is expected in this study are: Form a strategic policy to determine: management in dryland cropping, reduction in yield losses, Anticipation cope with drought, Form Software Geographical Information System on line to determine: Early Warning System, Change Climate Information, Information Level drought areas, particularly East Java, Cropping Pattern Change Information, National and the International Scientific Publications, Implementing collaboration between Higher Education (UPN "Veteran" East Java) with BPTP Malang

Drought is an insidious natural hazard characterized by lower than expected or lower than normal precipitation that, when extended over a season or longer period of time, is insufficient to meet the demands of human activities and the environment. Drought is a temporary aberration, unlike aridity, which is a permanent feature of climate. Seasonal aridity, that is, a well-defined dry season, also needs to be distinguished from drought, as these terms are often confused or used interchangeably. The differences need to be understood and properly incorporated in drought monitoring and early warning systems and preparedness plans.

Drought must be considered a relative, rather than an absolute, condition. It occurs in both high and low rainfall areas and virtually all climate regimes. Drought is often associated only with arid, semi-arid and sub-humid regions by scientists, policymakers and the public. In reality, drought occurs in most countries, in both dry and humid regions. Drought is a normal part of climate, although its spatial extent and severity will vary on seasonal and annual timescales.

A critical component of that strategy is a comprehensive drought monitoring system that can provide early warning of drought's onset and end, determine its severity and deliver that information to a broad clientele in many climate- and water-

sensitive sectors in a timely manner. With this information, the impacts of drought can be reduced or avoided in many cases.

Drought differs from other natural hazards in various ways. Drought is a slow-onset natural hazard that is often referred to as a creeping phenomenon. It is a cumulative departure from normal or expected precipitation, that is, a long-term mean or average. This cumulative precipitation deficit may build up quickly over a period of time, or it may take months before the deficiency begins to appear in reduced stream flows, reservoir levels or increased depth to the groundwater table. Owing to the creeping nature of drought, its effects often take weeks or months to appear (Figure 1). Precipitation deficits generally appear initially as a deficiency in soil water; therefore, agriculture is often the first sector to be affected. It is often difficult to know when a drought begins. Likewise, it is also difficult to determine when a drought is over and according to what criteria this determination should be made. Is an end to drought heralded by a return to normal precipitation and, if so, over what period of time does normal or above normal precipitation need to be sustained for the drought to be declared officially over? Since drought represents a cumulative precipitation deficit over an extended period of time, does the precipitation deficit need to be erased for the event to end? Do reservoirs and groundwater levels need to return to normal or average conditions? Impacts linger for a considerable period of time following the return of normal precipitation. Therefore, is the end of drought signalled by meteorological or climatological factors, or by the diminishing negative impact on human activities and the environment?

Another factor that distinguishes drought from other natural hazards is the absence of a precise and universally accepted definition. There are hundreds of definitions, adding to the confusion about the existence of drought and its degree of severity. Definitions of drought should be region and application specific or impact specific. Droughts are regional in extent and, as previously stated, each region has specific climatic characteristics.

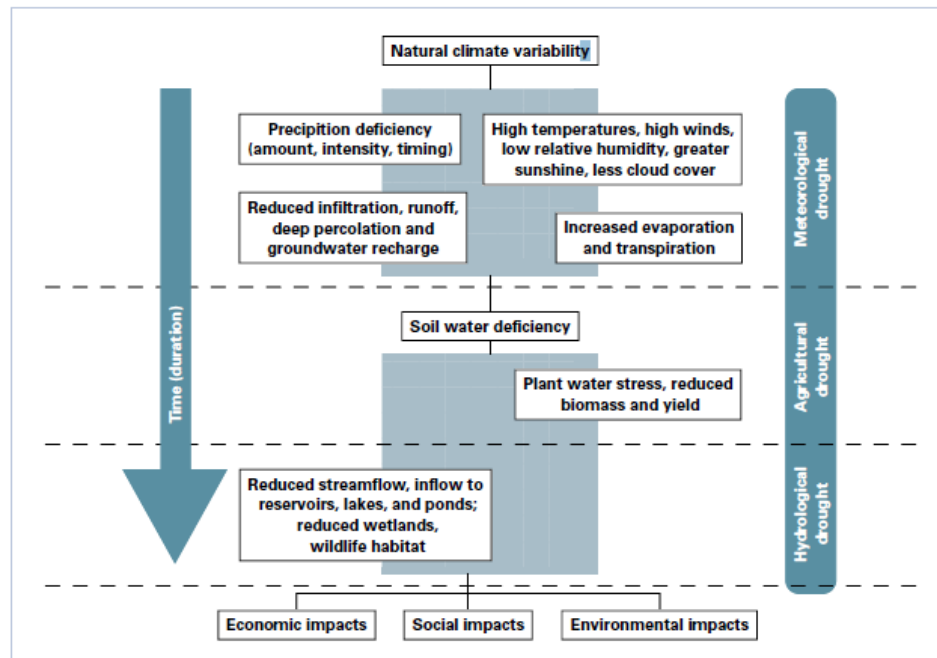


Figure 1. Sequence of drought occurrence and impacts for commonly accepted drought types (WMO, 2006).

Proposed Solution For Drought

A comprehensive and integrated approach is required to monitor drought more effectively and provide early warning. The collection of climatic and hydrologic data is fragmented between many agencies or ministries in most countries. Often these data are not reported in a timely fashion. Automating the data collection process can substantially improve the timeliness and reliability of drought monitoring and early warning systems.

The analysis of climate and water data is most effective when it is coordinated under a single authority. This authority could be an agency or ministry or an inter-agency authority and would be responsible for analysing data and producing useful end products or decision-support tools for delivery to end users. Stakeholders must be involved from the early stages of product development to ensure that the information will serve their varied timing and content needs. A delivery system should reflect the needs of this diverse clientele. The Internet is the most cost-effective way to deliver information, but it is inappropriate in many settings. A combination of Internet, extension, print and electronic media delivery may be

required in many instances. To date, monitoring and early warning systems have been based on a single indicator or climatic index.

Recent efforts to improve drought monitoring and early warning in the United States and other countries have provided new early warning and decision- support tools and methodologies in support of drought preparedness planning and policy development.

The lessons learned can be helpful models for other countries to follow as they try to reduce the impacts of future droughts. An effective monitoring, early warning and delivery system continuously tracks key drought and water supply indicators and climate-based indices and delivers this information to decision makers. This allows for the early detection of drought conditions and timely triggering of mitigation and emergency response measures, the main ingredients of a drought preparedness plan.

Drought Early Warning System (DEWS) is never a concept. Many applied Drought Early Warning Systems have been studying in many counties, and some have been used in practice. It is clear that DEWS can be used in many fields. There are many such samples. Its application in precision agriculture can be identified as available and efficient in this paper.

DEWS technological development speed is still very rapid reasonably. With the development of spatial information technology and modern communication, as well as the advance in computer hardware and software technologies, DEWS will explore new areas of applications and become more intelligent, efficient and steady. It may run online agroclimatic module from national meteorology, climate and geophysics board, etc.

The most common view of DEWS is a linear top-down warning chain that is expert-driven and hazard-focused from observation to warning generation and transmission to users. An effective and sustainable EWS needs to have not only a strong scientific and technical basis, but also a strong focus on the people exposed to risk, with a systems approach that incorporates all relevant factors in that risk, whether arising from natural hazards or social vulnerabilities or from short-term or long-term processes. EWS is ideally a system of systems: it should no longer be viewed only as a linear chain process, but rather as a mix (or other model) approach depending on the characteristics and complexity of risks, especially under climate change conditions.

Architecture Design

Architecture includes frameworks, institutional arrangements, norms, polycentric-multi-layered systems and structures. System to be designed is the application of technology-based forecasting system web service that is expected to run on the mobile web platform, thus facilitating dissemination of information about weather and potentially catastrophic drought. And early warning to farmers, researchers and policy-making in the agricultural sector.

Design of System

This application is designed to support drought early warning system and setting the cropping pattern, then the user of this system include: agriculture department officials, farmers' groups, and system administrators. The system design can expressed in figure 2 and figure 3.

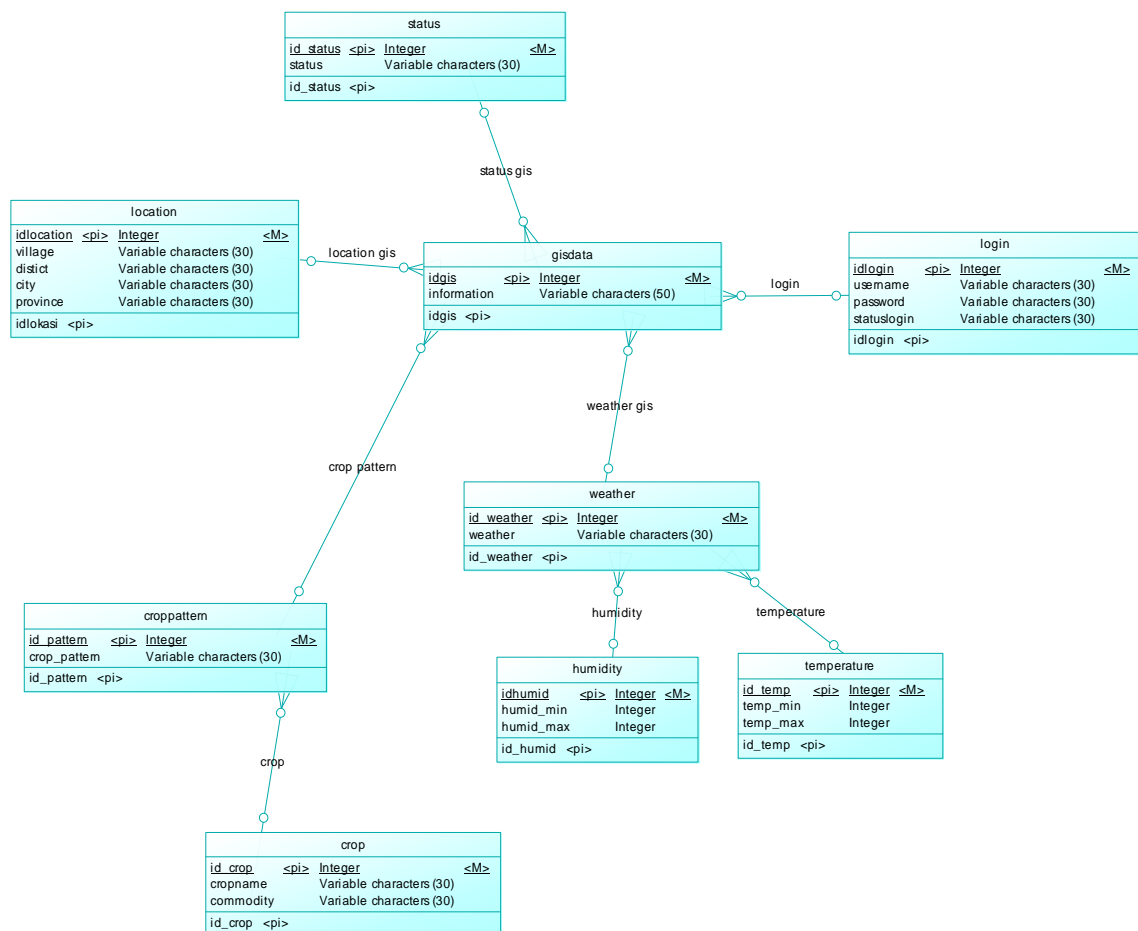


Figure 2. Conceptual Data Model of Drought Early Warning System

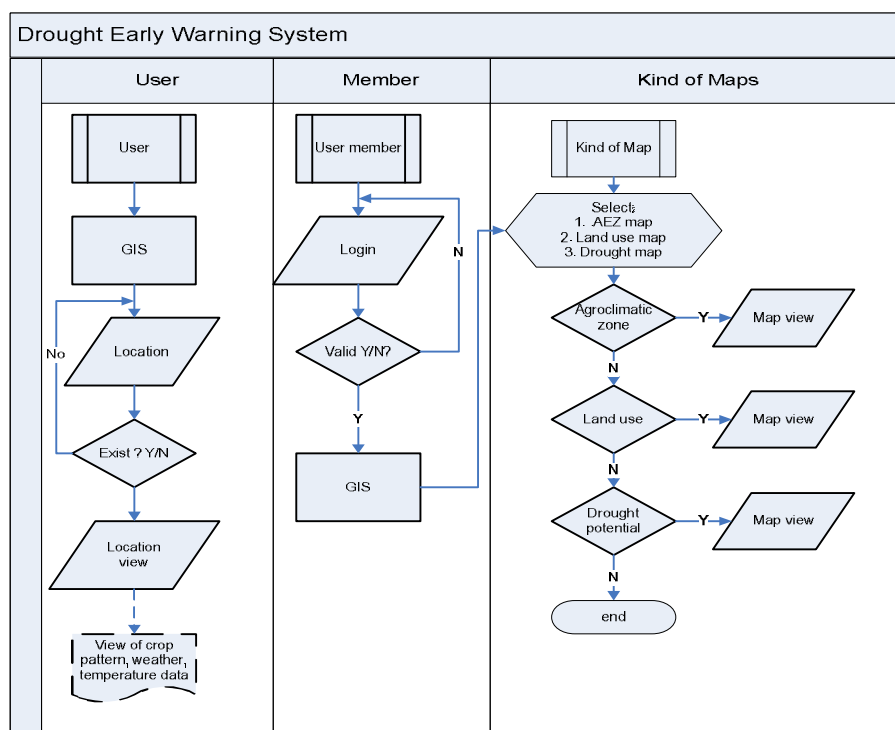


Figure 3. Flow Diagram of Drought Early Warning System

CONCLUSION

Drought affects more people than any other natural disaster and results in serious economic, social and environmental costs. The development of effective drought monitoring, early warning and delivery systems has been a significant challenge because of the unique characteristics of drought. Significant strides have been made in recent years to improve the effectiveness of these systems. With the increasing frequency and severity of drought in many regions of Indonesia and increased societal vulnerability, more emphasis is now being placed on the development of drought preparedness plans that are proactive rather than reactive and emphasize risk-based management measures. Improved drought monitoring is a key component of a drought preparedness plan and a national drought policy. Early warning systems can provide decision makers with timely and reliable access to information on which mitigation measures can be based. There are many challenges to improving these systems, but a comprehensive, integrated approach to climate and water supply monitoring is proving to be successful in many countries.

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